E-Wave

(July 2020-21)

DEPARTMENTOF
ELECTRONICS & COMMUNICATION ENGINEERING
GIFT, BHUBANESWAR

An ISO 9001:2008 Certified Institute

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

Electronics and Communication Engineering is one of the most upcoming areas of Research &Engineering among all other branches of engineering. As of today, Electronics and CommunicationEngineers are working in all spheres of modern industry. The goal of this course is to impart all-roundtechnical education to the students to fulfil the requirements of new challenges of industries to solve the practical problems of our daily life, as well as to find new ways.

The Department of Electronics and Communication Engineering was established in the year 2007. The department has well equipped Labs and dedicated and ebullient faculties having vast experience in their respective fields. Industrialvisits and practical projects are also encouraged by the department in various sectors.

Vision

To establish a conducive ambience for advancing and enriching the knowledge of electronicsand communication engineering, through qualitative and holistic collaboration amongstudents, faculties, PG Scholars, Domain experts from premier institutions andResearch laboratories

Mission

M1: *Motivate and educate students about fundamentals and latest technical skills in Electronics and Communication Engineering, Circuit Design and Signal Processing.*
M2 :*Create a distinctive culture of research and innovation among faculty members and students, with an inherent focus on behavioural and communication aspects .*
M3 : *Encourage students to undertake R&D activities through academia-industry collaboration for the societal needs with high ethical standards.*

.

Message from the Principal …

I am pleased to know that the Department of Electronics & Communication Engineering of Gandhi Institute For technology(GIFT),Bhubaneswar is bringing out its July 2018-19issue of "E-wave" . I extend my best wishes on the occasion of the publication of the technical magazine.I hope this magazine will be a treasure for those associated with Electronics & Communication Engineering and will help in providing a platform for sharing experiences & learning in this area.

Dr, S. Krishna Mohan Rao

Message from the HoD…

I am proud to see that the students of our department have put in appreciable effort into creating thee-magazine, E-Wave. It is good to see that today's generation has not lost its literaryroots, despite theperpetual efforts of e-Technology to extinguish the flames of the written word. This e-magazine is anexceptional proof that the literary flame is burning bright. I look forward to seeing the juniors taking up the reigns ofthis e- magazine infuture, so that this tradition remainseternal.

Prof. SaumendraBehera

From the Editor…

It gives me immense pleasure to announce the release of the July 2018-19 issue of E-Wave. The primary focus of thistechnical e- magazine is to empower our students with overall development.I am grateful to everyone involved in making this journey successful.

Prof.MonalisaSamal

"Successful and unsuccessful people do not vary greatly in their abilities. They vary in their desires to reach their potential."

CONTENTS:

Evolution of Microprocessor

The microprocessor has become a more essential part of many gadgets. The evolution of microprocessor was divided into five generations such as first, second, third, fourth, and fifth-generation and the characteristics of these generations are discussed below.

First Generation Microprocessors

The first generation microprocessors were introduced in the year 1971-1972. The instructions of these microprocessors were processed serially, they fetched the instruction, decoded and then executed it. When an instruction of the microprocessor was finished, then the microprocessor updates the instruction pointer & fetched the following instruction, performing this consecutive operation for each instruction in turn.

Second Generation Microprocessors

In the year 1970, a small number of transistors were available on the integrated circuit in the second-generation microprocessors. Examples of the second-generation microprocessors are 16-bit arithmetic 7 pipelined instruction processing, MC68000 Motorola microprocessor. These processors are introduced in the year 1979, and Intel 8080 processor is another example of the microprocessor. The second generation of the microprocessor is defined by overlapped fetch, decode, and execute the steps. When the first generation is processed in the execution unit, then the second instruction is decoded and the third instruction is fetched.The difference between the first generation microprocessor and second-generation microprocessors was mainly the use of new semiconductor technologies to manufacture the chips. The result of this technology resulted in a fivefold increase in instruction, speed, execution, and higher chip densities.

Third Generation Microprocessors

The third generation microprocessors were introduced in the year 1978, as denoted by Intel's 8086 and the Zilog Z8000. These were 16-bit processors with a performance like mini computers. These types of microprocessors were different from the previous generations of microprocessors in that all main workstation industrialists began evolving their own ISC based microprocessor architectures.

Fourth Generation Microprocessors

As many industries converted from commercial microprocessors to in house designs, the fourth generation microprocessors are entered with outstanding design with a million transistors. Leading-edge microprocessors like Motorola's 88100 and Intel's 80960CA could issue & retire more than one instruction per clock cycle.

Fifth Generation Microprocessors

Fifth-generation microprocessors employed decoupled superscalar processing, and their design soon exceeded 10 million transistors. In the fifth generation, PCs are a low-margin, high volume business conquered by a single microprocessor.On Dec 23rd, 1947, the Transistor was invented in Bell lab whereas an integrated circuit was invented in 1958 by J Kilby in Texas Instruments. So, Intel or INTegratedELectronics has invented the first microprocessor.

4-bit Microprocessor

The INTEL 4004/4040 was invented in the year 1971 by Stanley Mazor& Ted Hoff. The clock speed of this microprocessor is 740 KHz. The number of transistors used in this microprocessor is 2,300 and instruction per second is 60K. The number of pins of this microprocessor is 16.

8-bit Microprocessor

The 8008 processor was invented in the year 1972. The clock speed of this microprocessor is 500 KHz and instruction per second is 50K

The 8080 microprocessor was invented in the year 1974. The clock speed is 2 MHz. The number of transistors used is 60k and instruction per second is 10 times quicker as compared with 8008 processor.

The 8085 microprocessor was invented in the year 1976. The clock speed is 3 MHz. The number of transistors used is 6,500 and instruction per second is 769230. The number of pins of this microprocessor is 40.

16-bit Microprocessor

The 8086 microprocessor was invented in the year 1978. The clock speed is 4.77, 8 & 10 MHz. The number of transistors used is 29000 and instruction per second is 2.5 Million. The number of pins of this microprocessor is 40

The 8088 microprocessor was invented in the year 1979 and instruction per second is 2.5 Million

The microprocessors like 80186 or 80188 were invented in the year 1982. The clock speed is 6 MHz

The 80286 microprocessor was invented in the year 1982. The clock speed is 8 MHz. The number of transistors used is 134000 and instruction per second is 4 Million. The number of pins of this microprocessor is 68

32-bit Microprocessor

The Intel 80386 microprocessor was invented in the year 1986. The clock speed is 16 MHz to 33 MHz. The number of transistors used is 275000. The number of pins of this microprocessor is 132 14X14 PGA

The Intel 80486 microprocessor was invented in the year1986. The clock speed is 16MHz to 100 MHz. The number of transistors used is 1.2 Million transistors and instruction per second is 8 KB of cache memory. The number of pins of this microprocessor is 168 17X17 PGA (Pin Grid Array)

The PENTIUM microprocessor was invented in the year 1993. The clock speed is 66 MHz and instruction per second is Cache memory 8-bit for instructions 8- bit for data. The number of pins of this microprocessor is 237 PGA

64-bit Microprocessor

The INTEL core 2 microprocessor was invented in the year 2006. The clock speed is 1.2 GHz to 3 GHz. The number of transistors used is 291 Million and instruction per second is 64 KB of L1 cache for each core 4 MB of L2 cache.

The i3, i5, i7 microprocessors were invented in the years 2007, 2009, 2010 2. The clock speed is 2GHz to 3.3GHz, 2.4GHz to 3.6GHz & 2.93GHz to t 3.33GHz.

Fathima Zaheera
Asst.Professor,ECE

Ant-Sized IoT Radio

For over a hundred years and starting from Marconi's experiment, several generations of wireless devices have connected people with stations and with each other, resulting in over 6 billion mobile subscribers in the world today. The next exponential growth in connectivity is no longer in access between people but in connecting objects and machines in the age of "Internet of Things (IoT)". Projections show sensor demand growing from billions in 2012 to trillions within the next decade and this is largely fueled by emergence of smart sensors that combine computation, communication, and sensing. Ultra-low power smart radios that can provide unique IP addresses and their locations are the requirement for IoT.

In this context, battery-less radios are the ultimate frontier in scaling the size and cost of a communication node. They face unique challenges in addressing the need for sufficient data rate without using a power supply. However, there are several key challenges that still need to be addressed in this area. Cost (dominated by antenna board and interface), number of readable transponders (and latency in doing so), data-rate capacity, localization and miniaturization are the issues faced by today's designers. Addressing these challenges will open up new application areas for IoT. This could be in commercial, medical or industrial scenarios.

In the first phase of the project we have demonstrated a single-chip 24GHz/60GHz passive radio implemented in 65nm CMOS. This chip is fully self-sufficient with no pads or any external components (e.g. power supply). It integrates RX and TX antennas and provides a communication range up to 50 cm. A modified M-PPM 60GHz transmitter (6-bits per slot) is used to communicate data sequence as well as the local timing reference. Pulse signaling enables real-time localization through time-of-flight. The chip operates with a standby recovered power of less than 1.5uW coming from the reader.

Dr.I.V.Prakash
Professor,ECE

Software Defined Radio

Millimeter wave (mmWave) communications are envisaged to be integrated in the upcoming generation of mobile networks, namely eMBB, one of the 5G verticals. This has been seen as the solution to increase the overall capacity of mobile radio cells, enabling the support of multi-Gigabit/s transmissions towards mobile equipments. Due to the large available bandwidth (55–66 GHz), mmWave band is, thus, very attractive for future 5G wireless communication systems, which might provide transmission data rates over 10 Gbps and network latency below 1 ms. However, even if a 2 GHz channel in the 60 GHz band is used to transmit data employing both 4 and 16-Quadrature Amplitude Modulation (QAM) modulations, data rate would still be limited to 4 and 8 Gbps, respectively. Therefore, there is demand for improving both system reliability and data rates. In this context, it is introduced in this work a novel software-define radio (SDR) mmWave testbed, aimed to tackle the 5G communication requirements outlined.WithmmWave testbeds importance in mind, work at 60 GHz can be found in the literature . However, such works were conducted with universal software radio peripheral (USRP) that offer limited bandwidths of around 25 MHz capabilities, which do not fulfill the 5G foreseen multi-Gigabits scenarios. To this extent, this work discusses the implementation of a real-time software-defined radio mmWave testbed that can cope with the next wireless generation needs.

A software-defined radio (SDR) is a common term given to a system which employs the majority of physical layer functionalities using digital signal processing algorithms implemented in an embedded system with the aid of a specific software. In this context, typically, analog stages, such as mixing, amplification, filtering, modulators/demodulators, and essential to establish a wireless radio link, are digitally implemented rather than using discrete analog hardware components. Therefore, an ideal SDR is composed of very reduced hardware at the RF front-end, i.e., only an antenna and a very high speed sampler that is capable of capturing and digitizing a wideband radio signals [**5**]. However, relatively large coverage distances might only be attained by the employment of amplifiers prior to both DAC/ADC stages. For example, at the receiver, a Low-Noise Amplifier (LNA) must be considered to reduce the converter quantization noise and thus maximize the Signal-to-Noise Ratio (SNR) at the digital domain (after sampling); only then is the signal converted to its binary form. Next, data are processed on a number of dedicated computational units, inside the embedded system, enabling the implementation of crucial methods for demodulation, synchronization, and decoding, which are required to recover the transmitted information from advanced modulation techniques. Nevertheless, such architecture inherits the precision limitation from the digital domain representation, as well as it adds computation complexity to such digital domain. On the other hand, translating hardware discrete analog components functionalities into an embedded platform brings several advantages for a wireless communication system designer.

AmishaAgasti
2nd year,ECE

NanoRobotics

Nanomedicine offers the prospect of powerful new tools for the treatment of human diseases and the improvement of human biological systems. Nanomedicine is the process of diagnosing, treating, and preventing disease and traumatic injury, of relieving pain, and of preserving and improving human health, using molecular tools and molecular knowledge of the human body. Nanomedicine's nanorobots are so tiny that they can easily traverse the human body. Scientists report the exterior of a nanorobot will likely be constructed of carbon atoms in a diamondoid structure because of its inert properties and strength. Super-smooth surfaces will lessen the likelihood of triggering the body's immune system, allowing the nanorobots to go about their business unimpeded. Nanorobots can offer a number of advantages in drug delivery over present methods. These include more bioavailability, targeted therapy, fewer surgeon mistakes; reach remote areas in human anatomy, large interfacial area for mass transfer, non-invasive technique, this review focuses on the properties, method of preparations, mechanism of action, elements and applications of nanorobots. In addition, current study also involves the future aspects of nanorobots.

The field of microbiology has been successfully used as a springboard for the initial development of robotic functions in nanobiotechnology. Although microrobots and nanorobots can be constructed and have function[11], their use within the vascular system is limited by challenges with transportation and propulsion. An effective strategy for enabling propulsion of microrobots and nanorobots is coupling them to magnetotactic bacteria such as Magnetococcus, Magnetospirillummagnetotacticum or Magnetospirillum magneticum[12, 13]. The largest componenet of these nanorobots integrated into magnetotactic bacteria would be the bacterial cell component. The smallest known species of magnetotactic bacteria is the marine magnetotactic spirillum, which is 0.5 μm (500 nanometers), just above the upper limit of the NNI's definition of the nanoscale[14]. However, the marine magnetotactic spirillum's usefulness is limited by their speed, and magnetotactic cocci are more useful for intravascular function[14].

The magnetotactic bacteria can be guided in the desired direction using the application of magnetic fields[15]. The components of the magnetotactic bacteria that are responsive to the magnetic field are called magnetosomes. Magnetosomes are prokaryotic pseudo-organelles with about 15-20 magnetite crystals, each about 50 nm in diameter, contained within an invagination of the prokaryotic cell membrane[16]. Magnetite crystals are composed of Fe_3O_4, a common iron oxide. Magnetotactic cocci have been found to travel in consistent and predictable patterns following established geomagnetic lines[17].

Swati Kumari
3rd year,ECE

Laser Video Display

A prototype laser video projector which uses electronic, optical, and mechanical means to project a television picture is described. With the primary goal of commercial viability, the price/performance ratio of the chosen means is critical. The fundamental requirement has been to achieve high brightness, high definition images of at least movie-theater size, at a cost comparable with other existing large-screen video projection technologies, while having the opportunity of developing and exploiting the unique properties of the laser projected image, such as its infinite depth-of-field. Two argon lasers are used in combination with a dye laser to achieve a range of colors which, despite not being identical to those of a CRT, prove to be subjectively acceptable. Acousto-optic modulation in combination with a rotary polygon scanner, digital video line stores, novel specialized electro-optics, and a galvanometric frame scanner form the basis of the projection technique achieving a 30 MHz video bandwidth, high- definition scan rates (1125/60 and 1250/50), high contrast ratio, and good optical efficiency. Auditorium projection of HDTV pictures wider than 20 meters are possible. Applications including 360 degree(s) projection and 3-D video provide further scope for exploitation of the HD laser video projector.

Laser-based displays designed with the proper primary wavelengths allow large color gamuts with fixed color temperatures.Recent advances in compact, air-cooled, diode-pumped, solid-state visible microlasers have enabled the development of portable laser displays. Lasers are being developed for both "back-lit" displays and "direct-write" displays. In back-lit displays, the lasers replace arc lamps in liquid-crystal displays (LCDs) or digital-micromirror-display (DMD) projectors. In direct-write displays, the image is formed by directly modulating and scanning the laser beam.1 Compact, multiwatt red-green-blue (RGB) output laser modules have been demonstrated for use as "light engines" in projection displays generating greater than 500 ANSI lumens (see photo).In another article, we discussed the development of microlasers (see Laser Focus World, May 1998, p. 243). This article focuses on the use of microlasers in back-lit-display applications. We also touch briefly on direct-write-display applications.Laser-based displays designed with the proper primary wavelengths give rise to a very large color gamut with a fixed color temperature. Laser Power Corp. (LPC; San Diego, CA) has developed polarized microlasers with outputs at wavelengths of 457, 532, and 656 nm. These wavelengths yield an exceedingly large color gamut, thereby providing a display technology that nearly encompasses the entire color range of the human visual system. Color gamuts consistent with different technologies are shown in Fig. 1. A microlaser-based display provides greater color saturation in all three primaries than that afforded by conventional technologies. Due to the inherent monochromatic nature of laser light, color filters are not required. In addition, the primary wavelengths do not shift with time, so, as long as the relative RGB amplitudes from each laser are maintained, the color temperature remains fixed.

MayabatiHansda
4thyear,ECE

Holographic Information Storage System

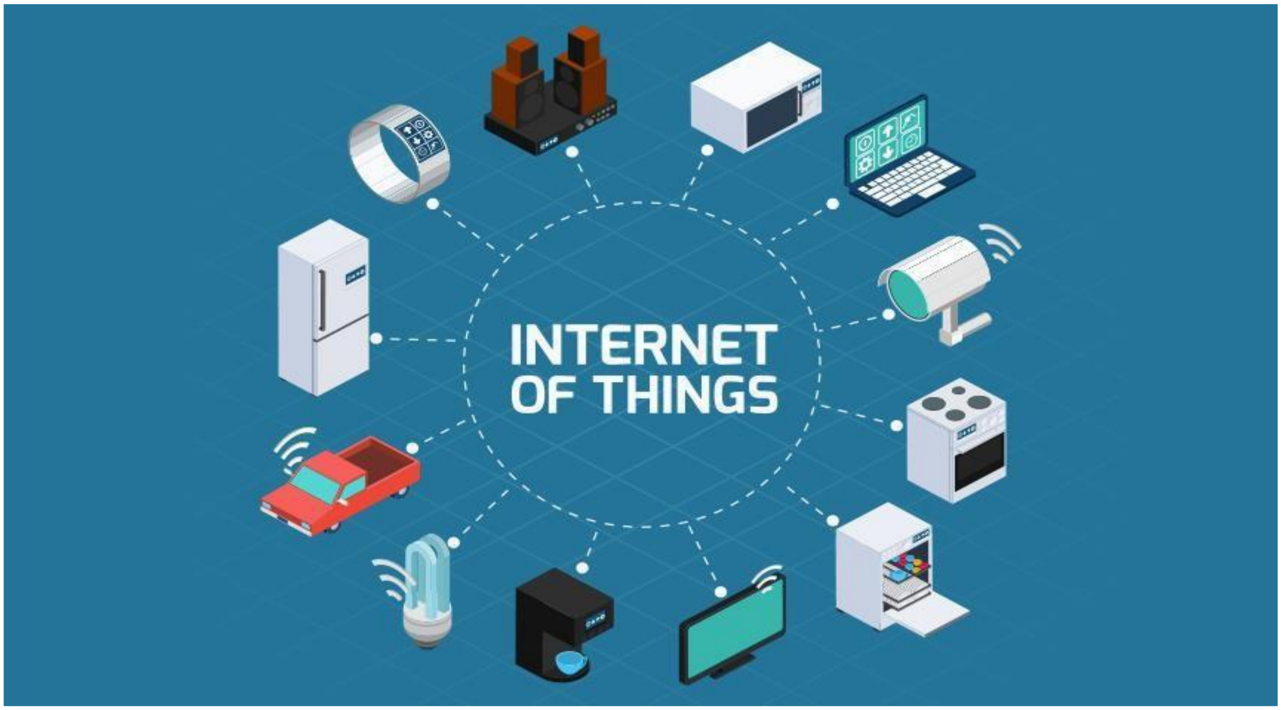
Holographic data storage has been discussed for decades. Once slated as the next generation of optical storage, it promised greater densities and access speeds than today's Blu-ray discs.Over the years, numerous research teams tried to build holographic systems that could meet the growing demands of data storage. However, these teams achieved few concrete results beyond the occasional prototype. Their efforts were not in vain, however. Microsoft breathed new life into holographic storage with Project HSD, a collaboration between Microsoft Research Cambridge and Microsoft Azure, whose goal is to adapt holographic technology to cloud-scale storage.

Holographic storage -- sometimes referred to as 3D storage -- is a volumetric storage system that uses lasers to read and write data, similar to other optical storage. However, media such as CDs, DVDs and hard disks can store data only on the medium's surface, limiting its capacity to two-dimensional storage. Holographic storage uses the entire volume, which makes it possible to store more data in a smaller space and increase data write and read speeds.

Polaroid researcher Pieter J. van Heerden first proposed holographic data storage in the early 1960s, not long after the invention of the laser. By the early 2000s, research teams in both industry and academia had made significant progress in demonstrating the technology's potential. Two prominent efforts came from Polaroid spinoff Aprilis and Bell Labs spinoff InPhase Technologies. Both companies tried to bring holographic storage to the market. In the end, however, neither one achieved commercial success. Dow Corning acquired Aprilis and InPhase eventually filed for bankruptcy.There were many other efforts as well, but none could turn the tide on holographic data storage. Most of these attempts focused on the use of circular media similar to CDs or DVDs to support write-once, read-many (WORM) operations, but holographic storage competed against more established technologies, which themselves had also advanced.

Silan Krishna Ranjan Sethi
4th year,ECE

DEPARTMENT ACTIVITIES



The Department of Electronics and Communication Engineering (ECE), Gandhi Institute For Technology (GIFT), Bhubaneswar organized a webinar on **"Introduction to Internet of Things and it's Architecture"** on August 28, 2021.
The event was organized in association with **Institution of Electronics and Telecommunication Engineers (IETE),** Bhubaneswar center. 70 no of faculties and students were participated in the event, which delved into cutting-edge topics in the field of Internet of Things.

In the inaugural session the welcome note was given by Prof. Saumendra Behera, HOD-ECE, GIFT Bhubaneswar, following with the keynote address was delivered by the Honorable Speaker of NIT Jamshedpur. In his session he has nicely elaborated on the overview of IoT with discussing the technologies, protocols and the various application issues. He also focused a detailed study on IoT, which is a collection of a number of technologies like smart sensors, RFID, communication technologies and Internet Protocols.
Prof. Saumendra Behera, HOD, Department of ECE, GIFT, Bhubaneswar delivered the felicitation address followed with Prof. Subrat Kumar Panda proposed the vote of thanks.

GALLERY


"Recent Trends in Telecommunication"
ON 20 th March 2019


"Recent Trends in Telecommunication"
ON 20 th March 2019